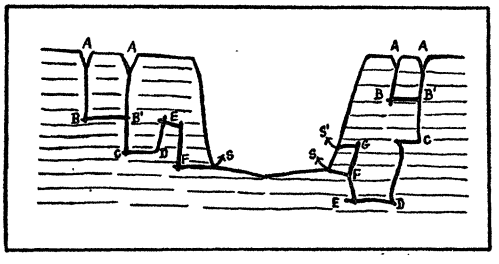
nature, if it ever occurs, and physiographers have done well (and physicists would do well) to omit it from their text-books. But in a modified form the siphon is probably occasionally operative. A figure which, although imperfect, is more in accord with the structure of limestone strata and the effect of solution upon them is given by de Martonne ("Traite de Geographie Physique," 1909, p. 347, fig.



147*A*). In this case (Fig. 1) the joints of the rock are shown to be widened by solution in such a manner as to make a siphon spring (*s*) possible. On the left a normal siphon is shown in which the spring does not flow until the reservoir *ABCD* is filled to *B*, that is, until the water begins to flow through the long arm *EF* of the siphon. On the right of the valley is an inverted siphon. It is perhaps unnecessary to state that although intermittent springs are the commonest of all springs the intermittent character seldom depends upon the presence of a siphon.

Sink Holes.—Sink or swallow holes are formed in one of two ways: (1) by the falling in of the roof of a cavern and (2) by the solution and erosion of the rock along joint or fault planes, the latter being by far the commoner origin. American writers of text-books of geology and physiography usually give but one explanation of the origin of these features and that the first and most unusual. Only two authors, as far as the writer is aware, give both. The popularity of the first explanation is probably due to the fact that the word "sink" implies a sinking in of the surface as well as the disappearance of the water by pouring into a funnel. The suggestion is offered that the older (?) term "swallow" hole be used, since it carries with it only the thought of the disappearance of the water in a throat or funnel.

Herdman F. Cleland
Williamstown, Mass.,
November 3, 1911

THE RÔLE OF SALTS IN THE PRESERVATION OF LIFE

In my address on "The Rôle of Salts in the Preservation of Life," published in No. 381 of Science, I made the following statement "Several authors, Lillie, McClendon and Lyon, have suggested that the fertilized egg is more permeable to salts than the unfertilized egg." Mr. R. Lillie calls my attention to the fact that he never made this suggestion. I feel it my duty not only to express my regrets for my oversight but to add that if my paper had dealt fully with the literature of the subject Mr. Lillie's ingenious experiments and original ideas should have occupied a prominent place in it, as those who are familiar with the subject will fully realize.

Jacques Loeb

SCIENTIFIC BOOKS

Observations and Investigations made at the Blue Hill Observatory, Massachusetts, U. S. A., in the Years 1906, 1907 and 1908, under the Direction of A. Lawrence Rotch. Annals of the Astronomical Observatory of Harvard College. Vol. LXVIII., Part II., 4to. Cambridge, Mass. 1911. Pp. 99–229, Figs. 15.

The work of the Blue Hill Observatory needs no introduction to the readers of Science. The progress of that unique institution, so important for American meteorology, has been faithfully recorded in the columns of this journal ever since the foundation of the observatory in 1884. Meteorologists have long since learned that the Blue Hill volumes of the *Annals of the Harvard College Observatory* are sure to contain results worthy of careful note and study.

Volume LXVIII., Part II., of these *Annals* contains the observations made twice daily in 1906–08; the usual summaries; results from the kite meteorograph and simultaneous records at the ground 1906–08; data obtained by means of *ballons-sondes* at Pittsfield, Mass., in 1908; supplementary data for a manned

balloon ascension from North Adams, Mass., July 29, 1908, and three memoirs. The first of these memoirs is by H. H. Clayton, on "A Study of Clouds with Data from Kites." Mr. Clayton has devoted himself so closely, for years, to the study of clouds and of kite data that this subject may in a very real sense be called peculiarly his own. The investigation is a very interesting one to all who have made any observations of clouds, and throws much light on many hitherto obscure points in cloud formation. In fact, it is one of the most suggestive discussions of the methods of cloud formation which has been published. The data used included all the measurements obtained up to January, 1909. A series of simple diagrams makes clear each step in the discussion. Cumulus clouds are found to be obviously caused by condensation in bodies of ascending air. Alto-stratus, alto-cumulus and cirro-stratus are probably formed in a stratum of air which is rising at a slight angle to the earth's surface. Strato-cumulus, on the other hand, is formed by a combination of local ascending currents and an ascending sheet of cloud. All clouds are found to be closely connected with inverted temperature gradients, the top of the cloud being usually in the coldest air immediately beneath the inverted gradient of temperature, and the height at which cloud formation can take place in the lower air being determined by the height above sea-level of the lowest inverted temperature gradient. The height above sea-level of the lowest inverted gradient of temperature and the complement of the dew-point determine whether days shall be cloudless or partly cloudy. There is thus a possibility of making practical use of the temperature and humidity observations obtained in the free air by means of kites and balloons for predicting the probable formation of various clouds, and therefore the probable weather that will follow. Mr. Clayton has left the staff of the Blue Hill Observatory, with which he was connected for nearly 23 years. His work there is well known to meteorologists the world over. His present study of clouds is perhaps the last memoir by him which will appear in the *Annals of the Harvard College Observatory*. It seems to us singularly appropriate that this particular study should have to do with kites and clouds, two lines of investigation which Mr. Clayton has done so much to further, and in which he has so unusually distinguished himself.

There are two further discussions, by Andrew H. Palmer, who has recently joined the staff of the observatory as research assistant, after leaving the graduate school of Harvard University. The first of these, on "Wind Velocity and Direction in the Free Air," deals with a subject concerning which the Blue Hill observations are able to supply valuable original data. There were used in this study the data obtained during 234 kite flights, made in 1897–1908; the cloud observations of 1890–91 and of 1896–97, and the *ballons-sondes* data from St. Louis, 1904–07. The principal results are as follows: (1) the general increase in velocity with height; (2) the rare occurrence of gusts of wind above low heights; (3) the frequent clockwise and occasional counter-clockwise changes of direction with height; (4) the shallow character of easterly winds; (5) the relative frequency of ascending currents as compared with those descending. It is easily seen that such results as these are of immediate practical importance in connection with aviation. Indeed, it is significant that both Mr. Clayton's study of clouds above referred to, and this one of Mr. Palmer's have such distinctly practical bearings.

A second paper by Mr. Palmer concerns "Pressure Oscillations of Short Wave-length." It appears that the pressure oscillations of short wave-length at Blue Hill are of two types, (1) those of 1–3 mm. amplitude, recurring irregularly over a period of several hours, and (2) those consisting of a single wave of 2–3 mm. amplitude occurring with certain thunderstorms. The former are due to the undulations set up at the horizontal boundary between two air strata of which the upper is the lighter, and in which the rate or direction of movement of one differs from that of the other. Type (2) seems to be

caused by the convectional currents in the agitated air mass of a thunderstorm. Comparatively little attention has thus far been paid to these short wave-length pressure oscillations, and Mr. Palmer has extended our knowledge of them by his examination of the Blue Hill records.

To have built and equipped, and to have maintained for more than 25 years, an observatory such as that on Blue Hill, which has done so much real pioneer work of the highest importance—surely this is a splendid contribution to science. To Professor A. Lawrence Rotch American meteorology, indeed meteorology everywhere, owes a debt which is year by year becoming greater.

R. DeC. Ward
Harvard University

Rock Minerals: Their Chemical and Physical Characters and their Determination in Thin Section. By Joseph P. Iddings. Second edition, revised and enlarged. New York, John Wiley & Sons; London, Chapman & Hall, Limited. 1911. Pp. 617. Cloth. $5.00.

That a second edition of Professor Iddings's work has so soon been called for speaks well for the growth of American petrography, while the constant tendency manifested toward a greater degree of refinement in methods speaks well for its future growth.

The present edition, so far as its plan is concerned, is practically identical with the first, the important difference being the addition of such new material as brings the work down to date. Upwards of 80 minerals are described not included in the first edition; "chiefly those occurring in pegmatites and segregated ores representing extremes of magmatic differentiation." Fifty-two figures are added in the text, and 67 pages of descriptive matter: a birefringence diagram is also added. Incidental to this diagram and the colored plate indicating the interference colors and birefringence of the various minerals it may well be asked if students entering upon the study of micro-petrography are ever tested for color blindness. It has often seemed to the reviewer that sundry imperfect (rather than erroneous) descriptions which have been published might be due to an inability on the part of the worker to distinguish the various colors, or at least to distinguish between their relative values.

The book, as in the previous edition, is divided into two parts, Part First, Chapter 1, being given up to a description of chemical principles and characters, and is identical with the edition of 1906. Chapter 2, dealing with the physical principles and characters, is also identical with the 1906 edition, and leaves nothing to be desired in its method of presentation. Chapter 3, on the optical properties, deals with what is perhaps the most difficult branch of the science for the student to master, and is naturally the most difficult to handle in a manner satisfactory to both worker and student. It demands the knowledge and the experience of the advanced worker and yet the teaching capacity of one who has not so far outgrown his student days as to be unable to appreciate the necessity of carefully detailed presentation. With the advanced student this chapter leaves little or nothing to be desired. As, with the exception of a page and a half on pleochroic halos, it is identical with the previous edition, nothing more need be said here regarding it.

Part 2 deals with the description of the various rock minerals taken up in the order of their chemical composition; alteration; crystallographic characters; optical properties; modes of occurrence; resemblances to other minerals, and laboratory production. It is to this portion of the book that the worker, however advanced, must have constant reference.

Professor Iddings is recognized the world over as an authority in all matters relating to petrography, and words commendatory are superfluous. The work is simply indispensable to all petrographers. The method of presentation is, however, naturally open to discussion. To the reviewer it would seem that for actual use and for purposes of ready reference more discrimination might well have been shown between minerals prominent as rock constituents and those rare: between